Remarks

The Examiner rejected claims 1, 2, 7, 11-13, 17 and 18 under 35 USC 102(b) as being anticipated by Moake (US 5,469,736). Further, the Examiner rejected claims 8-10 under 35 USC 103(a) as being unpatentable over Moake.

Applicants note that the Examiner objected to claims 3-6 and 14-16 as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims.

Applicants respectfully disagree with the Examiner's interpretation of the teachings of Moake. Applicants contend that original claim 1 is not anticipated by Moake or rendered obvious to a person of ordinary skill in the art by Moake. Indeed, Moake does not disclose, suggest, teach, or motivate the skilled person to combine so as to derive the features of independent claim 1.

More precisely, with respect to claim 1, the statement that Moake discloses "activating, by an activation device, drilling fluid flowing past the activation device", with reference to column 6, lines 42 through 56, is incorrect. In effect, Moake discloses the use of ultrasonic signals for measuring the time-of-flight between a piezoelectric crystal and the borehole wall as indicated in column 6, lines 42 through 56. Activating elements present in a fluid require using high energy radiation (e.g. neutron or gamma) that is absorbed by molecules/atoms of the fluid so as to produce an electronically excited state of the molecules/atoms. The process of activation of particular elements in the fluid present in the borehole, e.g. mud, is explained in detail in the present application (see para. [0016] of US 2006/0254350A1). It is impossible to activate elements present in the fluid using ultrasonic signals. Thus, the time-of-flight measurement method described in Moake, column 6, lines 42 through 56 does not teach or suggest the drilling fluid activating step of the present invention.

Further, the statement that Moake discloses "turning off the activation device for a time sufficient to create an unactivated slug of drilling fluid", with reference to column 6, line 63 through column 7 line 13, is incorrect. In effect, Moake discloses triggering a voltage signal to each of the transducers every 10 milliseconds such that the transducers emit ultrasonic signals sequentially in 2.5 millisecond intervals, as indicated in column

6, line 66 to column 7, line 2. This mode of operation of ultrasonic transducers is typicall because the same transducer is used as transmitter and receiver, as depicted in FIG. 3 and described in column 6, lines 42 to 49. Thus, this step is not the same as the activation device turning-off step of the present invention. It is to be emphasized that in the present invention the activation device emitting high energy radiation towards the drilling fluid is a completely different element than the gamma ray detector measuring the gamma ray emission of decaying activated molecules/atoms in the drilling fluid. Further, the transducer of Moake cannot be compared to an activation device or a gamma ray detector because all these elements have totally different construction and function, and are based on totally different physics. Thus, the mode of operation of the ultrasonic transducers describes in Moake column 6, lines 63 through column 7, lines 13 does not teach or suggest the step of turning off the activation device of the present invention.

Furthermore, the statement that Moake discloses "detecting the unactivated drilling fluid slug at a known distance from the activation device", with reference to column 8, lines 15 through 24, is incorrect. Instead, Moake teaches in this paragraph (i.e., column 8, lines 15 through 24) how the acoustic velocity is measured or estimated. This is substantially different from the detection of the unactivated drilling fluid. In addition, it is to be noted that Moake does not disclose or suggest that an unactivated drilling fluid slug would be detected by a gamma ray detector positioned at a known distance from the activation device. In effect, Moake teaches the use of a gamma ray density detector and a neutron source used for density and porosity measurements of the formation, respectively. This is well known in the art as explained in the present invention (see para. [0002] of US 2006/0254350A1).

Furthermore, the statement that Moake discloses "determining a time-of-flight for the unactivated drilling fluid slug to travel the distance", with reference to column 7, line 54 through column 8, line 24, is incorrect. Indeed, Moake teaches in this paragraph (i.e., column , line 54 through column 8, line 24) how the standoff of the transducer from the borehole wall is calculated based on the time-of-flight measured by the ultrasonic transducers. As disclosed by Moake (see column 6, lines 42 through 54), the piezoelectric crystal of the transducer generates ultrasonic signals that travel through the drilling fluid surrounding the tool and are reflected by the borehole wall. A portion of

the ultrasonic signal reflects from the borehole wall and is received by the piezoelectric crystal. The arrival time of the received signal is recorded and a time-of-flight signal is generated by electronic circuitry. In contrast, the time-of-flight of Moake corresponds to the elapsed time between transmission of the ultrasonic signal and reception. Thus, in contradistinction with the present invention, the time-of-flight does not correspond to the delay necessary for the unactivated drilling fluid slug to travel the distance between the gamma ray detector and the activation device. As a consequence, Moake does not teach or suggest any of the steps of independent claim 1. Therefore, there is no reason to amended independent claim 1, as it is allowable over the prior art.

Moreover, with respect to claim 2, the statement that Moake discloses "calculating drilling fluid velocity from the time-of-flight and the known distance", with reference to column 8, line 3 through 24, is incorrect. To the contrary, Moake teaches that the acoustic velocity of the drilling fluid may be measured dynamically by various known techniques (not mentioned), assigned a value based on the known borehole conditions, or estimated based on parameters related to the drilling fluid, the fluid weight, the fluid salinity, temperature and pressure (see column 8, line 15 through 24). Thus, Moake does not teach or suggest the calculation of the drilling fluid velocity in the manner of the present invention.

It is respectfully submitted that original claim 11 is not anticipated by Moake or rendered obvious to a person of ordinary skill in the art. Indeed, the mentioned reference does not disclose, suggest, teach, or motivate the skilled person to combine so as to derive the features of independent claim 11, for substantially the same arguments that have been presented above regarding original independent claim 1.

In addition, Applicants would like to emphasise that, contrary to the Examiner' statement, Moake does not teach or suggest that the control circuitry would be used to turn off the activation device for a time sufficient to create an unactivated slug of drilling fluid flowing past the tool. Moake instead teaches the use of a central processing unit or CPU equivalent to control circuitry that is used to operate, in particular, toggle, the ultrasonic transducer from a transmitting mode to a receiving mode, and vice-versa (see column 6, lines 63 through column 7, lines 13). Further, Moake teaches the use of a gamma ray density detector and a neutron source used for

density and porosity measurements of the formation, respectively. The present invention uses an activating device and a gamma ray detector in a completely different way. In particular, determining the properties of the formation is not the primary use of the present invention. The present invention focuses on the determination parameters such as the time-of-flight for the unactivated drilling fluid slug to travel the distance between the activating device and the gamma ray detector, the drilling fluid velocity, the borehole volume over said distance, the borehole diameter over said distance, and/or the downhole volumetric flow rate. As a consequence, Moake does not teach or suggest any of the features of independent claim 11. Therefore, there is no need to amend independent claim 11, as it is allowable over the prior art.

The above remarks made with regard to the last step of independent claim 1 and claim 2, respectively, also apply with respect to claims 12 and 13. The features of these claims are not disclosed or suggested by Moake.

Conclusion

Applicant is of the opinion that this reply is fully responsive to all outstanding issues. Accordingly, the application is now deemed to be in condition for allowance, and favorable reconsideration on the basis of these remarks is requested.

This paper is submitted in response to the Office Action mailed July 24, 2008, for which the three-month date for response is October 24, 2008. Please apply any charges not covered, or any credits, to Deposit Account 50-2183 (Reference Number 21.1069).

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